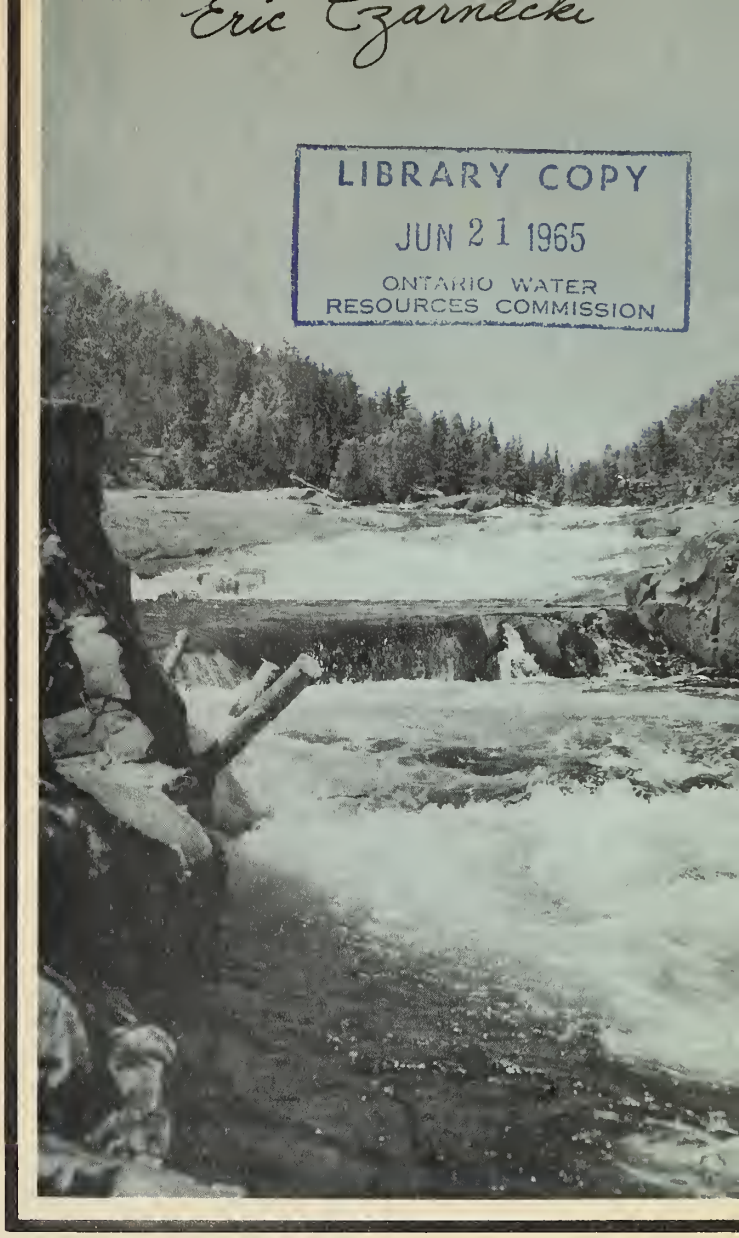
Brantford Water Pollution Control Plant



1963 Annual Report

Ontario Water Resources Commission

ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Mayor and Members of Council,
City of Brantford.

Gentlemen:

I am pleased to submit, for your information, the 1963 Annual Operating Report of the Brantford Water Pollution Control Plant, OWRC Project #58-S-11, which has been prepared by our Division of Plant Operations.

We are grateful for the kind cooperation which you and your staff have extended to our Operations staff throughout the year. We look forward to a continuing close association with you in our mutual endeavour to control pollution on the Grand River.

Yours very truly,

D. S. Caverly, P. Eng.
General Manager

General Manager,
Ontario Water Resources Commission.

Dear Sir:

It is with pleasure that I present to you the Annual Report of the operation of the Brantford Water Pollution Control Plant, OWRC Project #58-S-11 for 1963.

This report presents design data, outlines operating problems encountered and summarizes in tables, charts and graphs all significant flow and cost data.

Yours very truly,

B. C. Palmer,
Director,
Division of Plant Operations.

foreword

This report is designed to present the highlights of the operation of these works during 1963. Trends in flows and other operating data can be extremely useful in the development of necessary long range enlargement and improvement programs.

In addition to the activities reported herein, much unrecorded effort has contributed to the success of this operation. The municipality, through representatives on the Local Advisory Committee, has given valuable assistance in reviewing salary schedules, detailed operating budgets, personnel problems, flow patterns, and major maintenance problems.

The Division of Plant Operations has provided direction to the field staff in administrative procedures, quality control, maintenance schedules, equipment inspection and purchase supervision. A number of other Divisions of the Commission have been of service. The Division of Construction has offered helpful advice on equipment selection and renovation problems. The Division of Sanitary Engineering has maintained, through its District Engineering staff, a keen interest in the operation and has made a number of constructive recommendations. Its operator training courses have been very helpful. The Division of Finance has processed many payrolls, purchase orders and invoices dealing directly with this project. The Commission Personnel Director has been most helpful in the selection of new staff.

The excellent cooperation of all of these groups is gratefully acknowledged.

B. C. Palmer,
Director,
Division of Plant Operations

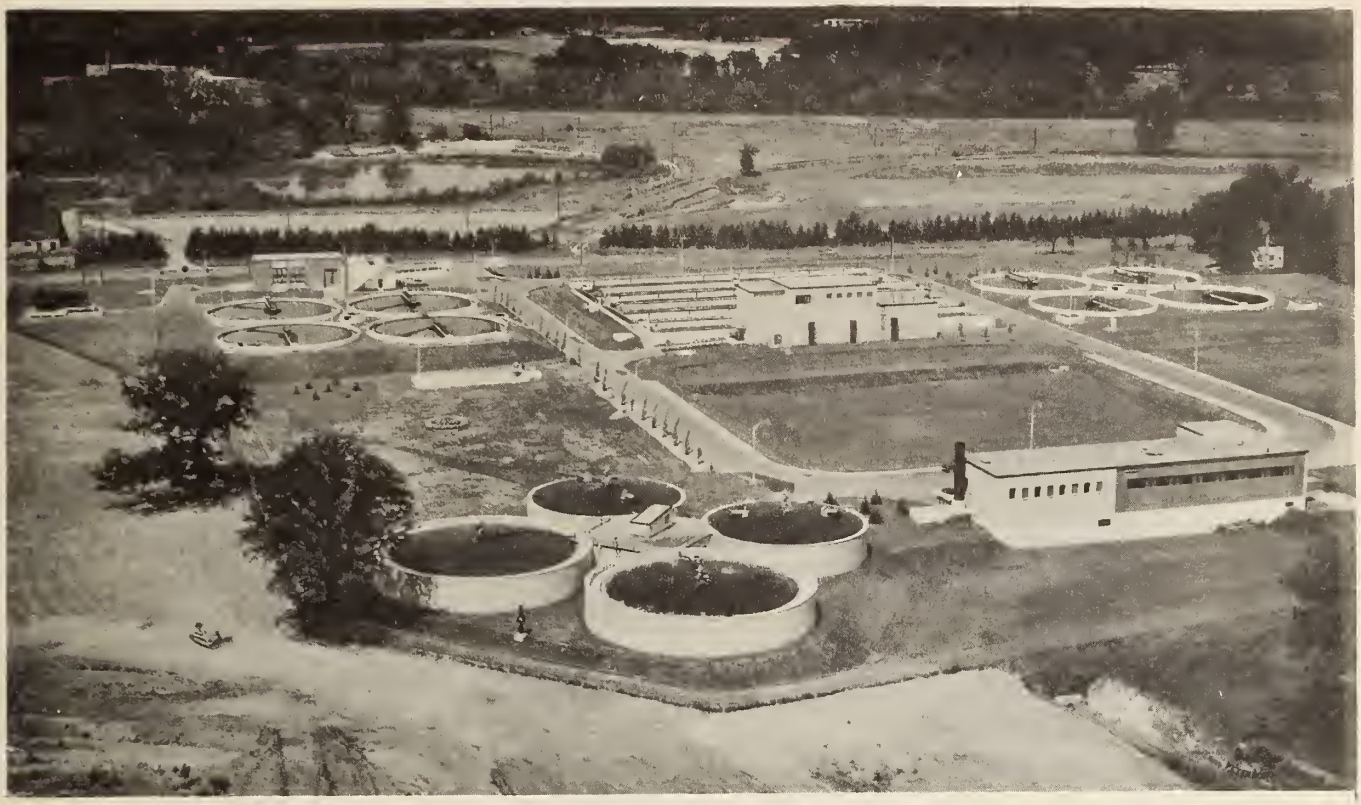
ONTARIO WATER RESOURCES COMMISSION

DIVISION OF PLANT OPERATIONS

contents

Mr. C. W. Perry
Assistant Director
Mr. A. C. Beattie
Assistant Supervisor
Mr. P. J. Osmond
Operations Engineer

BRANTFORD WATER POLLUTION CONTROL PLANT



OPERATED FOR

THE CITY OF BRANTFORD

BY

THE ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN

A. M. Snider

COMMISSIONERS

W. D. Conklin, Q. C.
J. H. H. Root, M. P. P.
J. A. Vance, LL. D., P. Eng.
A. A. Wishart, Q. C., M. P. P.

GENERAL MANAGER

D. S. Caverly

ASSISTANT GENERAL MANAGERS

G. M. Galimbert
L. E. Owers

COMMISSION SECRETARY

W. S. MacDonnell

1956 to 1963 History

INCEPTION

In 1956, the City of Brantford and the Ontario Water Resources Commission initiated plans for the construction of a modern water pollution control plant.

The firm of Proctor and Redfern - Toronto, Ontario, Consulting Engineers, was engaged to prepare plans and specifications for the project.

APPROVAL

Late in 1956, the city signed an agreement with the Ontario Water Resources Commission to finance, construct and operate the plant.

CONSTRUCTION

Dunker Construction Limited - Kitchener, Ontario began construction in 1958, and by January of 1960, the Division of Plant Operations took over the operation.

TOTAL COST

$ 2,225,000.00

PROJECT STAFF

Mr. George Bragg

Superintendent

Shift Foremen

C. Burnside
J. Harcourt
E. Hosner
W. Mabbott
L. Miller

Laboratory Technician

T. Alkema

Mechanic

F. Robus

Maintenance Foreman

J. Wilkinson

Filter Operator

G. McLaughlin

Groundskeeper

F. Grummett

Clerk

S. Nettleton

Operators

A. Alonzo
H. Bradshaw
D. Calder
E. Micks
D. Milne
G. Ott
C. Parsons
B. Reansbury
A. Stafford

COMMENTS

As shown above, the total staff complement is twenty-two men, which is a reduction of one man since the beginning of 1963. During 1963 there were four resignations from the staff and one staff member was transferred to another OWRC plant, accepting the position of Chief Operator. These vacancies were filled by hiring four new men at operator level and by promoting one man from within. It is planned that the latter's former position will be handled by casual labour when required.

Also during 1963 one of the Shift Foremen, Mr. Burnside, was appointed to the position of Assistant Superintendent. He will act as Assistant Superintendent only in the absence of the Superintendent and normally works under the title of Shift Foreman. A summer student was employed to provide assistance for an expanded laboratory program, which is experienced each summer, and to provide vacation relief for the permanent laboratory technician.

Three members of staff received Certificates of Qualification as Sewage Works Operators as a result of their successful completion of a series of three weekly courses of instruction sponsored by the OWRC. Three other members of staff successfully completed the first weekly course of a repeat of the above mentioned series of instruction.

Description of Project

INFLUENT WORKS

The sewage enters the plant through a 48 inch diameter sewer and passes through a parshall flume where the flow is metered. From the parshall flume it divides and passes through two rotogrators. The rotogrators employ bar screens to trap the larger solids and cutting knives to mascerate these solids. A bypass channel is provided to facilitate any repairs to the rotogrators. Flow from the rotogrators is directed to two wet wells where it is pumped by four raw sewage pumps, each having a capacity of 5.5 million gallons per day, to two detritors located on the roof of the garage.

The detritors are square shallow tanks which allow sand and grit to settle. The washed grit is collected and removed from the detritor mechanically and stored in a large hopper. The grit is removed from the storage hopper and disposed of on the adjacent city sanitary land fill.

PRIMARY CLARIFIERS

Four circular clarifiers, 70 feet in diameter, receive sewage from the grit removal units. It is retained in the clarifiers for 2 hours at design flow. Approximately 50 percent of the suspended solids in the incoming sewage settles to the bottom of the clarifiers. Each clarifier is equipped with a circular sludge collector which moves the settled sludge to a hopper located at the bottom of the clarifier. The sludge is then pumped to digestion tanks.

AERATION

Settled sewage from the primary clarifiers flows by gravity to two triple-pass aeration tanks. There it is mixed with activated sludge which is returned from the final clarifiers and aerated. Each "pass" of the aeration tanks is 30 feet wide, 15 feet deep and 200 feet long. The total length of each aeration tank is therefore 600 feet.

The aeration section retains the sewage for 6 hours at a flow rate of 12½ million gallons per day. This detention time is decreased by the flow rate of the return sludge.

It is possible to add the primary effluent to the aeration section at various points. This permits the use of modifications to the activated sludge process such as step aeration.

Air is supplied by three blowers each equipped with a 200 HP motor. Each blower is capable of delivering 13,800 cubic feet of air per minute.

FINAL CLARIFIERS

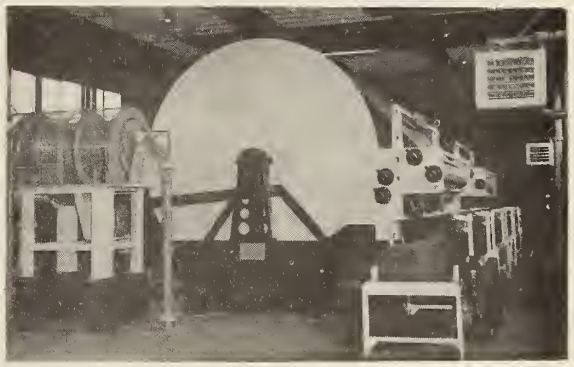
The aerated mixed liquor from the aeration section is retained in four final clarifiers, identical in size to the primary clarifiers for two hours at design flow. This allows the activated sludge to settle and it is collected in the bottom of the tanks and returned to the aeration section or wasted. (Excess activated sludge is returned or "wasted" to the primary clarifiers where it settles and is pumped to the digesters.) The remaining liquid flows over the weirs of the final clarifiers, and is chlorinated in the chlorine contact chamber and flows to the river as plant effluent.

SLUDGE DIGESTION TANKS

The Brantford plant utilizes two stage digestion. There are four digesters; two primary tanks each 55 feet in diameter and two secondary tanks each 70 feet in diameter. The piping between the

tanks is so arranged that it is possible to remove sludge from any one of the primary tanks to either of the secondary digesters. It is also possible to remove sludge from the primary digester directly to the vacuum filtration area.

The primary digesters are equipped with fixed steel covers. Two draft tube mixers recirculate the contents of the digester. Each secondary digester is provided with a floating gas holder steel cover. Heat is applied to the contents of the primary digester tanks only.



VACUUM FILTERS

Sludge from the digester is pumped to two vacuum filters. Each filter has a filtering area of 350 square feet and employes coiled stainless steel springs as the filter media. The "drums" are placed under a vacuum and moisture is thus withdrawn from the sludge. Appurtenances included with the filters are vacuum pumps, filtrate receivers, lime and ferric chloride tanks, mixing tanks and sludge pumps.

Design-Data

GENERAL

Type of Plant - Activated sludge.

Design Population - 65,000

Design Plant Flow - 12 1/2 MGD

Per Capita Flow - 190 gallons /day

Five Day BOD -

Raw Sewage - 180 PPM

Removal - 90%

Suspended Solids -

Raw Sewage - 180 PPM

Removal - 90%

PRIMARY TREATMENT

Influent Sewer

48" concrete sewer with a 48" by-pass.

Screening

Two coarse bar screens with 5" spaces provided.

Comminution

Two size 43 Infilco Rotogrators each having a capacity of 8 MGD.

Raw Sewage Pumps

Four 12" Fairbanks-Morse pumps, each having a capacity of 3840 GPM at 45' total head and driven by a 75 HP motor. Pumps are float controlled by depth in the wet well.

Grit Removal

Two Dorr Detritors, Type WA, for concrete collecting tank 20' square x 5' total depth with common cleaning mechanism (grit rake) 2'3" wide x 29'5" sloping length and two organic return pumps. Velocity through the detritor is less than one foot per second.

Primary Settling Tanks

Four circular concrete settling tanks each 70' in diameter x 10' SWD complete with Eimco Process Type "C" primary settling tank mechanisms.

Detention time - 2 hours at design flow of 12.5 MGD.

Grit Storage

One 27 cu. ft. hopper as manufactured by Dodge Mfg. Division, United Steel Corp. with a 12" x 12" rack and pinion slide gate.

SECONDARY TREATMENT

Aeration Tanks

Triple pass process involving six tanks each 200' long x 30' wide x 15' deep. Detention time of six hours at design flow 12.5 MGD.

Air Supply to Tanks

Eight 24' headers in each tank. Eighteen Walker Process Diffusair Spargers @ 16 1/2" centres per header. Total number of Spargers per tank equals 144. Total number of Spargers in aeration section equals 864.

Air Blowers

Three Sutorbilt heavy duty blowers, 18 x 18 series 600, supplying 4296 cfm @ 9 psig. Each blower is driven by a 200 HP Tamper Synchronous Motor. Three Tamper M-6 motor generator sets provide D. C. excitation to above synchronous motors.

Secondary Settling Tanks

Four circular concrete settling tanks each 70' in diameter x 10' SWD complete with Eimco Process Type "C" secondary settling tank mechanisms. Detention time - two hours at design flow of 12.5 MGD.

DIGESTERS

Primary

Two concrete tanks 55' diameter x 19'6" SWD - (maximum liquid height 18'6" at side wall, 25'3" at centre.)

Volume of each tank 49,300 cu. ft. or 300,000 gallons. Each tank is equipped with a fixed steel dome roof as manufactured by Dorr-Oliver complete with mixer.

Secondary

Two concrete tanks 7" diameter x 25'6" SWD - (maximum liquid height 22'6" at

Secondary - Continued

side wall, 30'9" at centre.) Volume of each tank 97,200 cu. ft. or 600,000 gallons. Each tank is equipped with a Dorr Secondary Type "B" centre guided gas holder cover having 5' lift and designed for six water inches gas pressure.

Heat Exchangers

Two Dorrco spiral heat exchangers - size #34.

Vacuum Filtration

Two Komline-Sanderson Coil Filters 11'6" diameter x 10' long. Filter area of 350 sq. ft./filter. Production (manufacturer's specifications) 5 lbs. of dry solids/sq. ft./hour. Drum speed - three to twelve min./revolution. Vacuum pump (one for each filter) - Nash Hytor L-7 driven by 50 HP motor at 570 rpm with drawing 1000 cfm at 12" Hg. vacuum.

CHLORINATION

One Fischer and Porter model 70C2410 manual rate adjustment with solution feed operating in conjunction with one Fischer and Porter liquid chlorine evaporator.

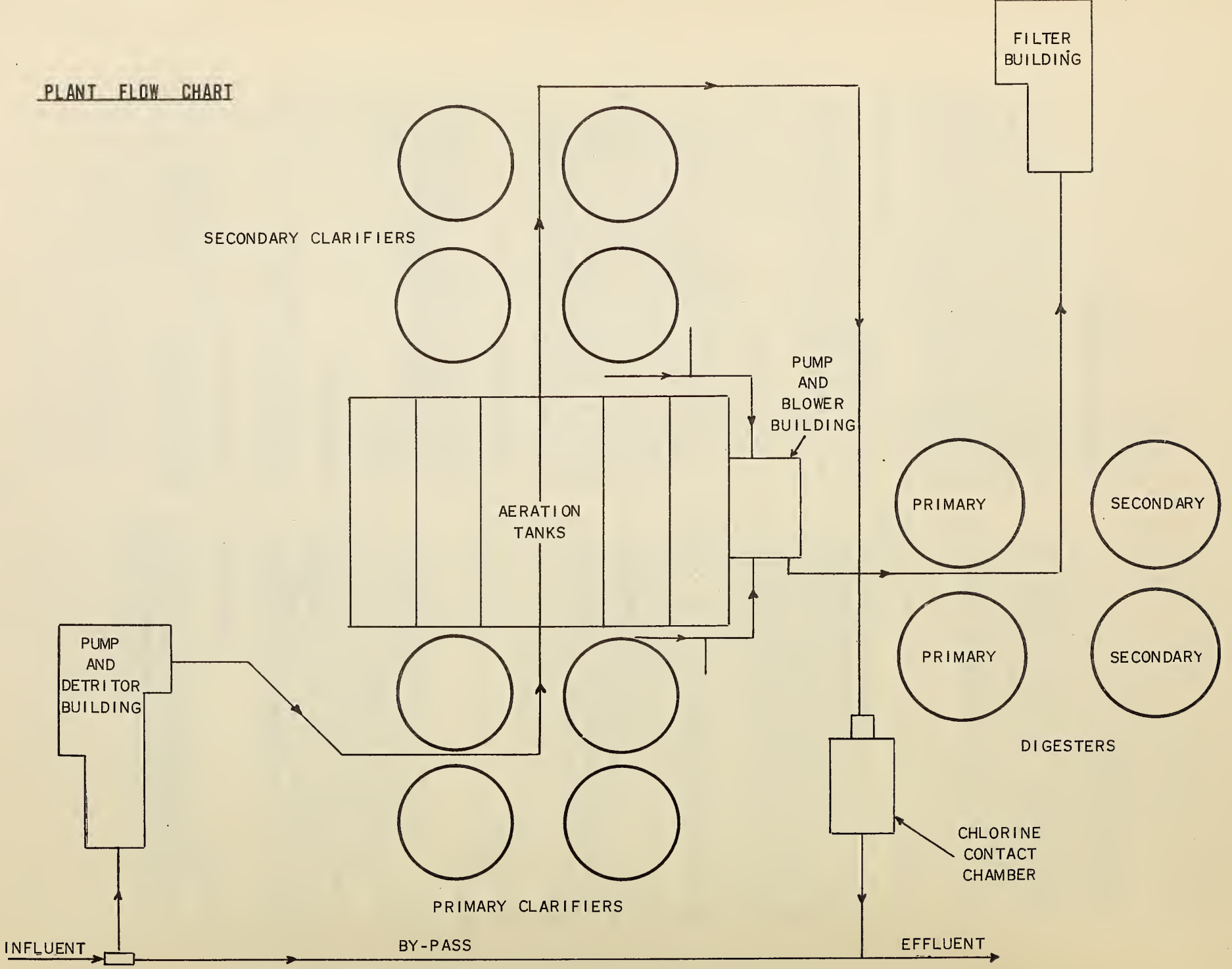
Weigh Scale

One Fairbanks-Morse #12140, 60" x 48" platform with two cradles.

Chlorine Storage

Sufficient area to store up to twenty one ton cylinders.

PLANT FLOW CHART



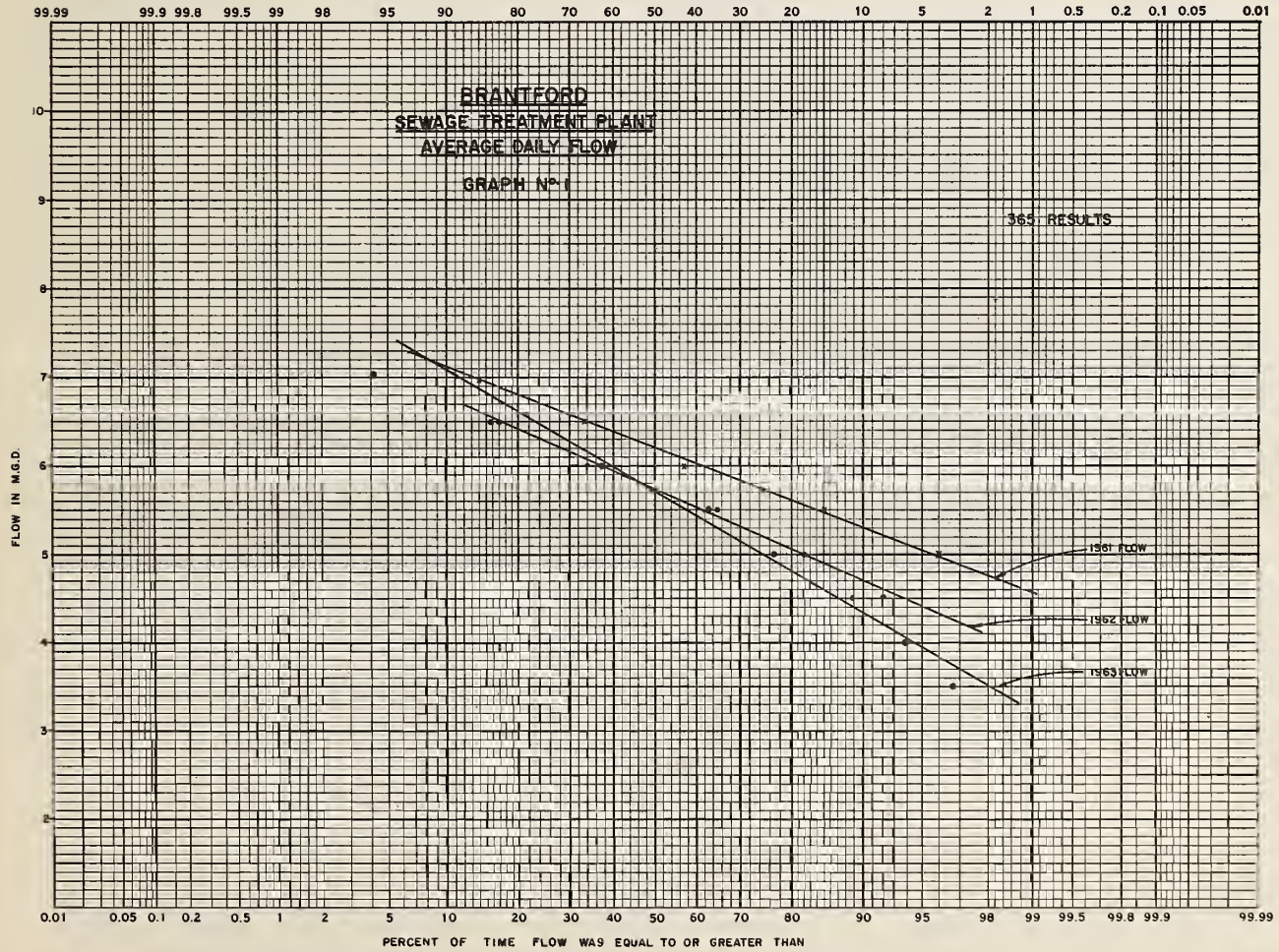
Process Data

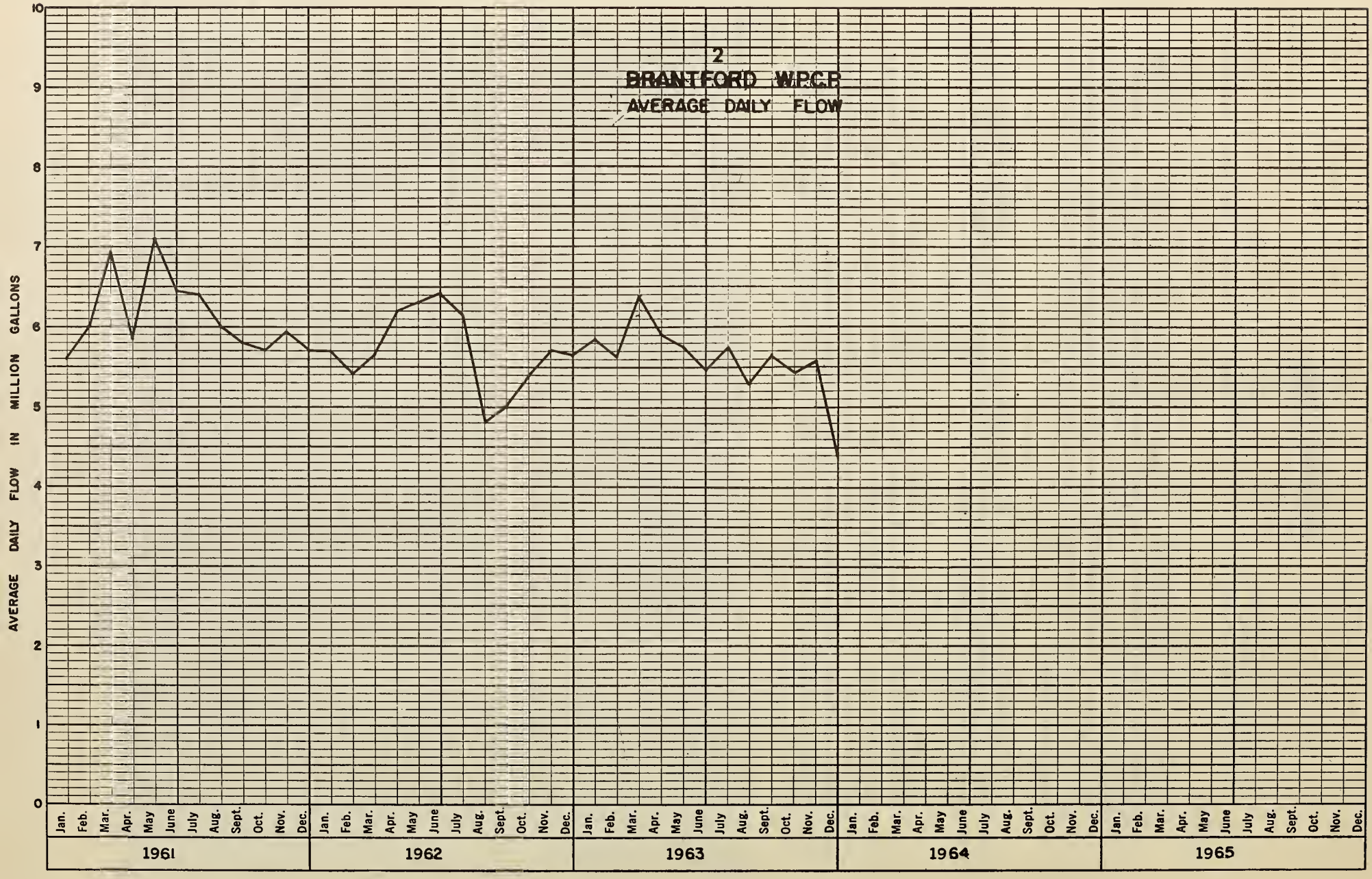
Flow

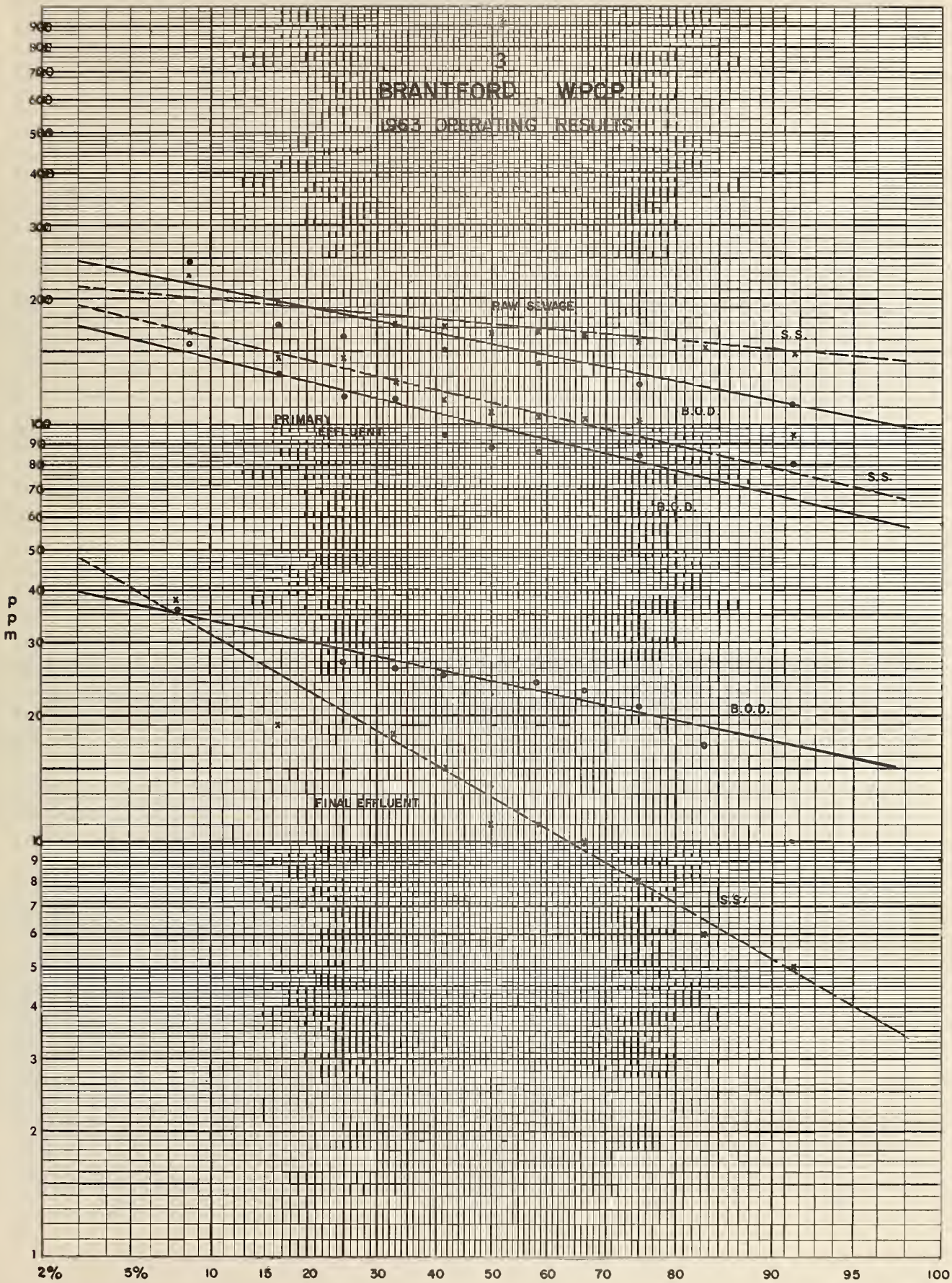
As will be noted from the accompanying charts and graphs, the average daily flow and total flow for the year were slightly less than the 1962 flows. During 1963 the average daily flow was 5.59 as compared to 5.67 million gallons per day in 1962. This is a decrease of 1.4%. During the past year, 2.04 billion gallons of raw sewage composed of both industrial and domestic waste received complete treatment.

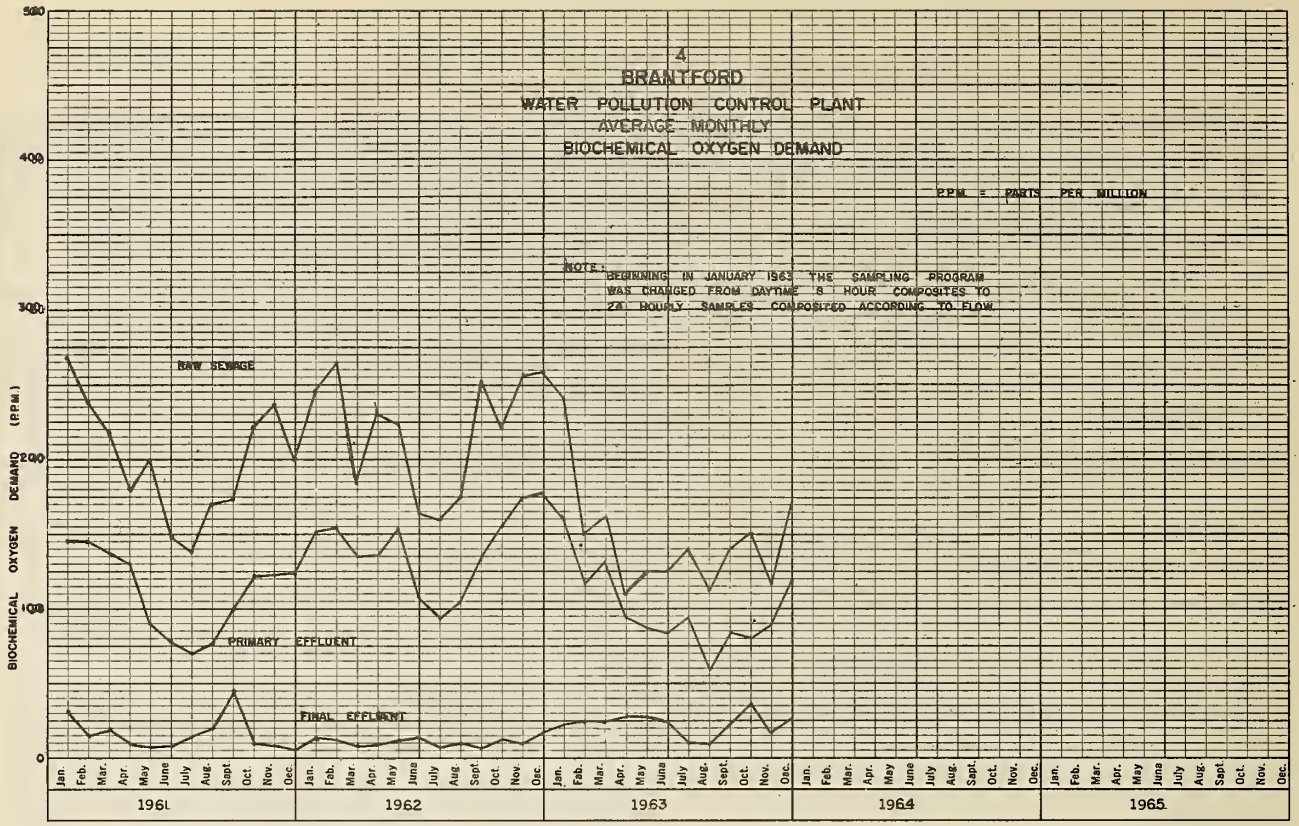
The maximum 24 hour flow in the past year was 9.5 million gallons and occurred in the month of March as did the greatest average daily flow for one month of 6.38 million gallons.

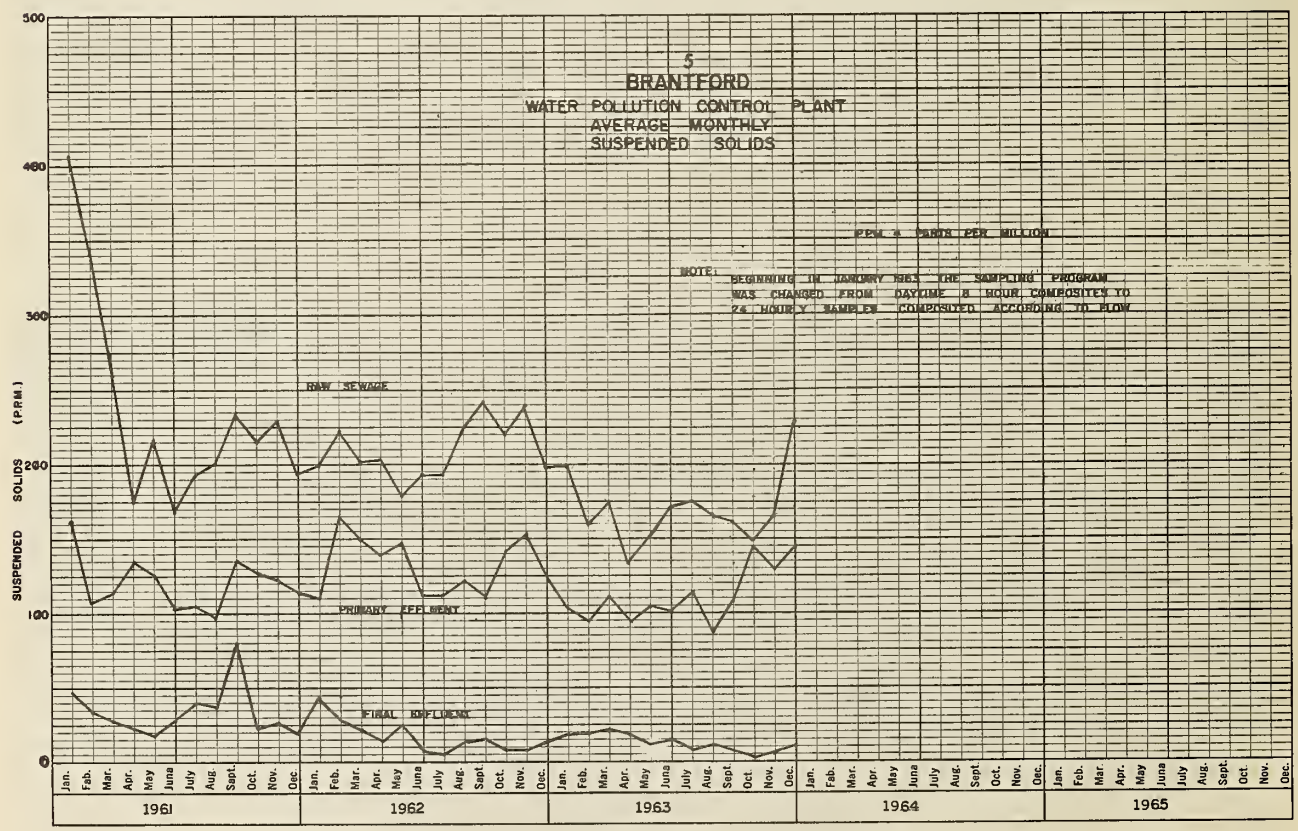
In 1964, the addition of the Eastern Circumferential Sewer to the system should result in a daily flow increase of 700,000 gallons or about a 10% increase over existing flows. The larger portion of this is anticipated from the Massey Ferguson Company who have requested the installation of a 1,000 GPM water connection. Assuming a combined industrial and domestic sewage of normal strength this additional flow will not impair the efficiency of treatment being obtained at this plant.




2
BRANTFORD WPCP
AVERAGE DAILY FLOW
AVERAGE DAILY FLOW IN MILLION GALLONS
0
1
2
3
4
5
6
7
8
9
10
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1961
1962
1963
1964
1965


3
BRANTFORD WPCP
1963 OPERATING RESULTS
RAW SEWAGE
S.S.
B.O.D.
PRIMARY EFFLUENT
S.S.
B.O.D.
B.O.D.
FINAL EFFLUENT
S.S.
ppm
2%
5%
10
15
20
30
40
50
60
70
80
90
95
100
PERCENT OF SAMPLES EQUAL TO OR GREATER THAN


4
BRANTFORD
WATER POLLUTION CONTROL PLANT
AVERAGE MONTHLY
BIOCHEMICAL OXYGEN DEMAND
P.P.M. = PARTS PER MILLION
NOTE: BEGINNING IN JANUARY 1963 THE SAMPLING PROGRAM WAS CHANGED FROM DAYTIME 8 HOUR COMPOSITES TO 24 HOURLY SAMPLES COMPOSITED ACCORDING TO FLOW.
BIOCHEMICAL OXYGEN DEMAND (P.P.M.)
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
0
100
200
300
400
500
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1961
1962
1963
1964
1965

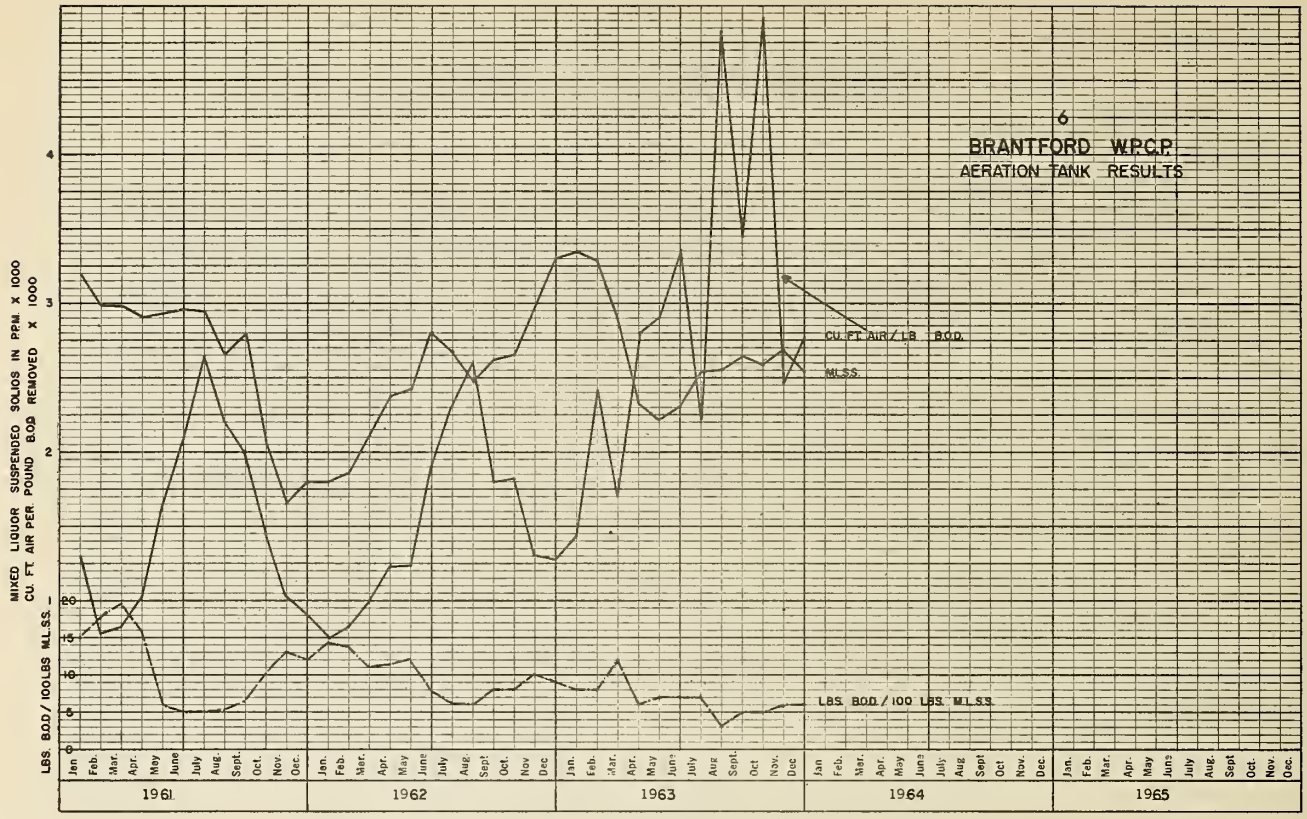

5
BRANTFORD
WATER POLLUTION CONTROL PLANT
AVERAGE MONTHLY
SUSPENDED SOLIDS
P.P.M. = PARTS PER MILLION
NOTE: BEGINNING IN JANUARY 1963 THE SAMPLING PROGRAM WAS CHANGED FROM DAYTIME 8 HOUR COMPOSITES TO 24 HOURLY SAMPLES COMPOSITED ACCORDING TO FLOW.
SUSPENDED SOLIDS (P.P.M.)
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
0
100
200
300
400
500
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1961
1962
1963
1964
1965

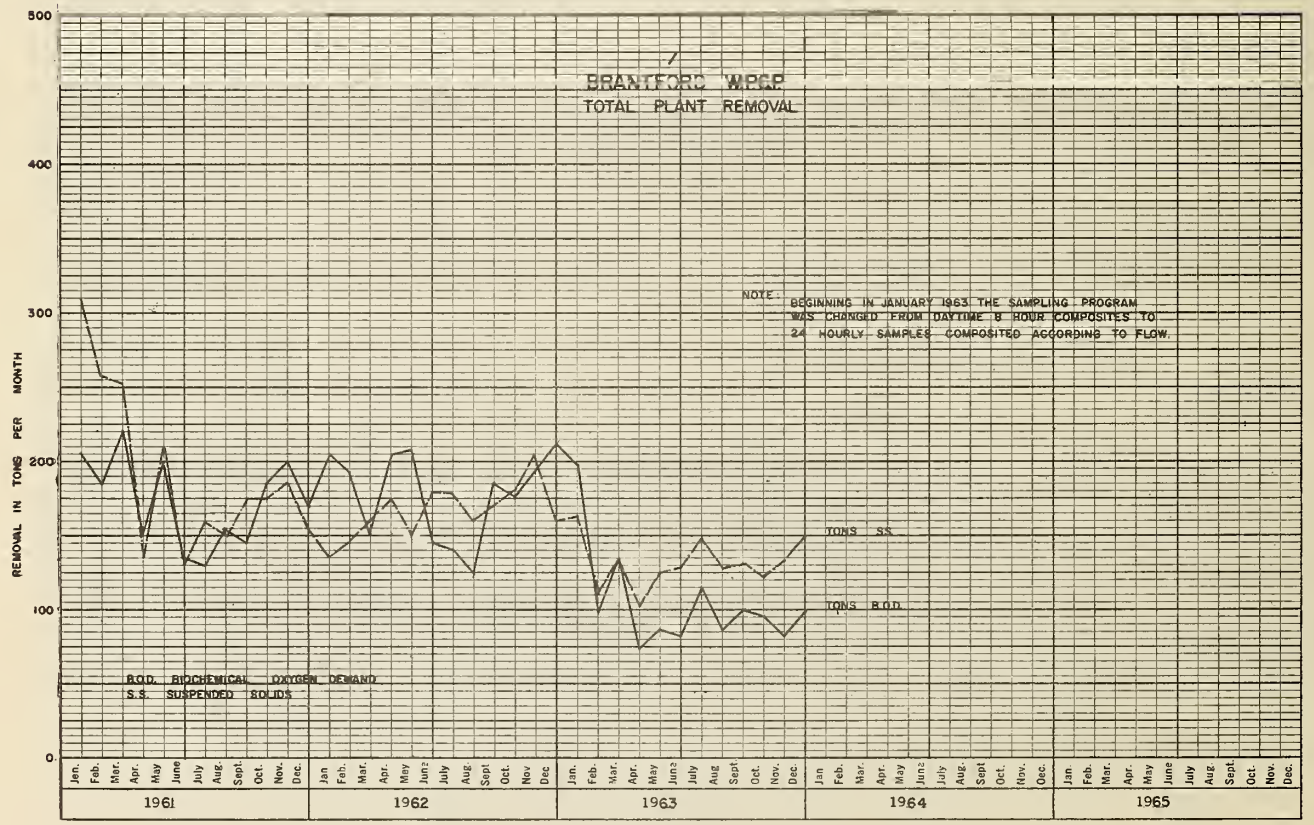
GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT PPM	EFFLUENT PPM	% REDUCTION	TONS REMOVED	INFLUENT PPM	EFFLUENT PPM	% REDUCTION	TONS REMOVED	
JANUARY	242	23	90.5	198	198	18	91	163.	1,129
FEBRUARY	150	24	84.0	98	159	19	88	110	1,035
MARCH	162	24.8	84.5	135.3	175	38	78.0	135.5	953
APRIL	110	27	75.5	73.4	134	18	86.5	102.5	1,487
MAY	124	27	78	86	151	11	92.5	124.5	1,007
JUNE	125	24	81	82.5	171	15	91	128	528
JULY	140	10	93	115.5	175	8	95.5	148	566
AUGUST	112	8.8	92	86	166	11	93.5	128	721
SEPTEMBER	140	21	85	100.5	162	6	96.0	131.5	835
OCTOBER	150	36	76	96	149	2	98.5	123	648
NOVEMBER	116	17	85.5	82.5	165	5	92.0	133	675
DECEMBER	172	26.4	85	99.5	228	10	95.5	149	571
TOTAL									10,155
AVERAGE	145.3	22.4	84.6	104.4	169.5	13.5	92.3	131.3	846

COMMENTS

An average loading of 145.3 ppm BOD and 169.5 ppm S.S. was experienced in the raw sewage in 1963. The average BOD in the effluent of 22.4 ppm was slightly higher than the OWRC standard of 15 ppm, whereas the average S.S. in the effluent of 13.5 ppm is slightly below the OWRC standard of 15 ppm. The efficiencies of removal of 84.6% and 92.3% for BOD and S.S. respectively are quite satisfactory. The grit removed per million gallons of sewage treated, 4.98 cu. ft. indicates a large percentage of combined sewers in the sewer system.


6
BRANTFORD W.P.C.P.
AERATION TANK RESULTS
MIXED LIQUOR SUSPENDED SOLIDS IN P.P.M. X 1000
CU. FT. AIR PER POUND B.O.D. REMOVED X 1000
LBS. B.O.D. / 100 LBS. M.L.S.S.
CU. FT. AIR / LB. B.O.D.
M.L.S.S.
LBS. B.O.D. / 100 LBS. M.L.S.S.
1961
1962
1963
1964
1965


BRANTFORD W.P.C.P.
TOTAL PLANT REMOVAL
REMOVAL IN TONS PER MONTH
NOTE: BEGINNING IN JANUARY 1963 THE SAMPLING PROGRAM WAS CHANGED FROM DAYTIME 8 HOUR COMPOSITES TO 24 HOURLY SAMPLES COMPOSITED ACCORDING TO FLOW.
TONS S.S.
TONS B.O.D.
B.O.D. BIOCHEMICAL OXYGEN DEMAND
S.S. SUSPENDED SOLIDS
1961
1962
1963
1964
1965

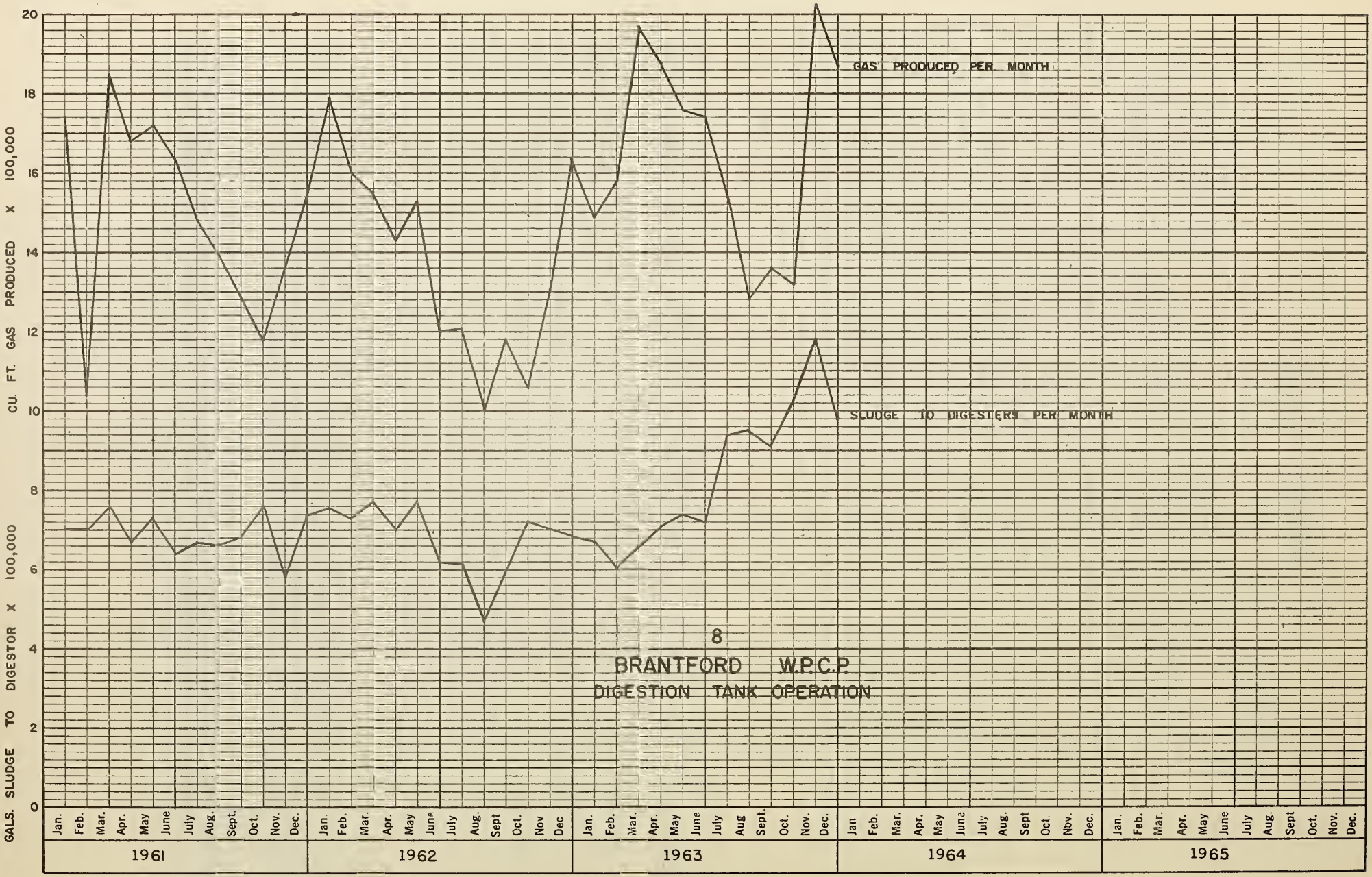
AERATION SECTION

MONTH	PRIM. EFFL. B.O.D. PPM	M.L.S.S. PPM	LBS. B.O.D. PER 100 LBS. M.L.S.S.	CUBIC FEET AIR PER LB. B.O.D. REMOVED
JANUARY	158	3353	8	1428
FEBRUARY	116	3291	8	2413
MARCH	131	2900	12	1721
APRIL	80	2326	6	2828
MAY	86	2212	7	2951
JUNE	84	2304	7	3370
JULY	94	2536	7	2275
AUGUST	58	2388	3	4838
SEPTEMBER	84	2640	5	3466
OCTOBER	80	2596	5	4922
NOVEMBER	88	2697	6	2466
DECEMBER	118	2536	7	2761
TOTAL:				
AVERAGE:	98	2648	7	2953

COMMENTS

During 1963 difficulty was experienced in wasting excess activated sludge to the primary settling tanks. Although a determined effort was made to reduce the mixed liquor suspended solids, they only dropped from 3,300 to 2,600 ppm.

As a result of the high mixed liquor suspended solids and the low BOD of the primary effluent, the BOD loading to the aeration tanks was lower than is considered desirable. Consequently, the air consumption per pound of BOD removed was higher than normal.



8

BRANTFORD W.P.C.P.

DIGESTION TANK OPERATION

DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			% VOL. MAT. IN DIGESTED SLUDGE	GAS PRODUCED 1000's CU. FT.	SLUDGE FROM DIGESTER 1000's GALS.
	1000's GALLONS	% SOLIDS	% VOL. MAT.*			
JAN.	688.25	4.52	68.5	57.1	1,492	674.79
FEB.	630.52	4.84	70.0	58.5	1,577	638.53
MAR.	690.59	4.94	70.0	55.2	1,971	695.85
APR.	744.35	4.21	70.5	56.7	1,838	819.75
MAY	766.85	4.45	66.0	41.4	1,762	915.95
JUNE	745.57	4.58	69.5	53.1	1,745	715.74
JULY	947.76	4.49	65.0	51.9	1,535	891.69
AUG.	988.09	4.37	65.5	55.9	1,284	857.58
SEPT.	949.85	3.86	65.5	56.1	1,365	933.56
OCT.	1,061.56	3.66	68.0	57.4	1,322	990.20
NOV.	1,230.71	4.20	67.0	59.1	2,043	1,031.01
DEC.	1,021.51	4.60	70.5	58.1	1,869	1,037.96
TOTAL	10,105.61				19,803	10,202.61
AVERAGE	842.13	4.39	67.9	55.0	1,650	850.

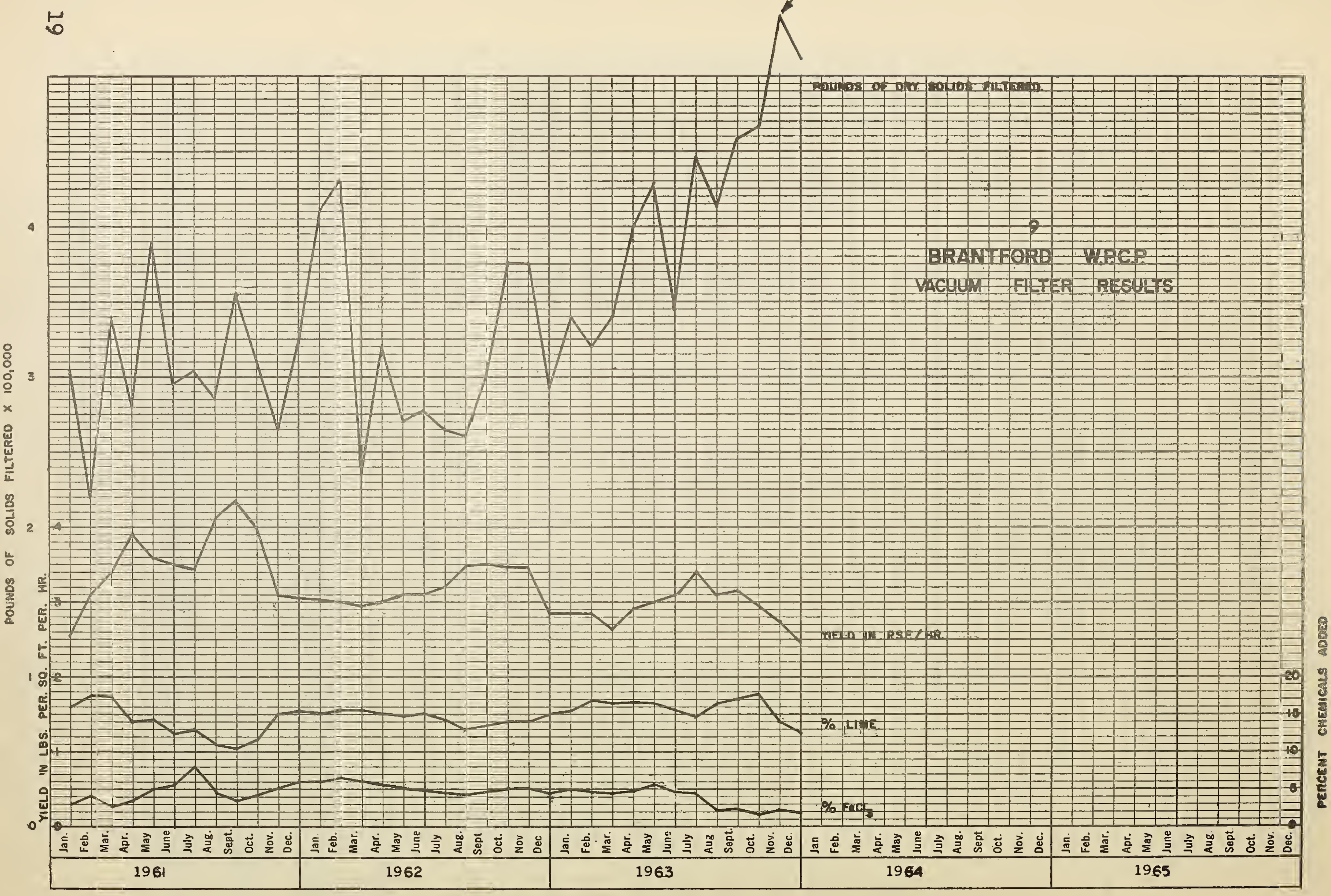
* VOL. MAT. = VOLATILE MATTER.

COMMENTS

A total of 10,105,610 gallons of raw sludge representing an increase of 24.4% over 1963 was pumped to the digester in the past year. An average concentration of 4.39% solids was obtained which represents a total of 4,446,468 lbs. of total solids.

As very little superntant is obtained at this plant, the volume of sludge into the digesters is very close to the volume out.

A total of 19,802,000 cu. ft. of gas was produced to supplement the fuel supply at the plant. The cubic feet of gas produced per pound of volatile matter was 6.6 which is within the average accepted values of 6 to 10.


9
BRANTFORD W.P.C.P
VACUUM FILTER RESULTS
POUNDS OF DRY SOLIDS FILTERED
YIELD IN PSF/HR.
% LIME
% $FeCl_3$
POUNDS OF SOLIDS FILTERED X 100,000
YIELD IN LBS. PER. SQ. FT. PER. HR.
PERCENT CHEMICALS ADDED
0
1
2
3
4
5
10
15
20
Jan.
Feb.
Mar.
Apr.
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.
1961
1962
1963
1964
1965

VACUUM FILTER OPERATION

MONTH	FILTER HOURS		% SOLIDS DIGEST SLUDGE	LBS. DRY SOLIDS FILTERED	LBS. LIME	% LIME	LBS. $FeCl_3$	% $FeCl_3$	% SOLIDS FILTERED SLUDGE	YIELD PSF/HOUR
	#1	#2								
JAN.	170.48	171.50	5.04	340,432	53,020	15.5	16,738.5	5.0	14.6	2.85
FEB.	176.08	152.16	5.05	324,925	55,055	16.9	15,414.5	4.87	14.4	2.85
MAR.	175.00	174.91	5.18	342,059	55,615	16.3	16,089.1	4.66	14.5	2.71
APR.	198.01	184.46	4.89	399,619	66,290	16.4	19,475.3	4.9	14.2	2.90
MAY	207.72	207.77	4.78	427,925	72,055	16.5	22,909.0	5.25	14.4	3.00
JUNE	187.33	127.91	4.82	346,185	54,530	15.7	16,584.5	4.78	15.3	3.15
JULY	199.23	179.73	5.02	447,204	55,615	14.9	19,496.6	4.35	15.2	3.39
AUG.	195.63	193.32	4.88	414,000	69,965	16.5	8,415.2	2.05	16.0	3.10
SEPT.	210.92	211.16	4.88	460,071	68,260	16.9	10,362.8	2.25	17.0	3.15
OCT.	225.67	226.92	4.76	468,220	82,495	17.7	8,493.8	1.87	16.6	2.96
NOV.	284.22	280.40	4.43	548,390	77,350	14.0	12,545.5	2.31	15.0	2.72
DEC.	302.26	294.13	4.53	515,907	64,855	12.7	10,480.5	2.07	14.7	2.47
TOTAL	2,532.55	2,404.37		5,034,937	775,105		177,000.3			
AVERAGE	211.05	200.36	4.86	419,578	64,592	15.8	14,750.0	3.70	15.2	2.94

COMMENTS

During 1963, 2,517 tons of dry solids were filtered. The solids from the digester were increased from an average of 4.86% solids to 15.2% solids. At 15.2% solids the 2,517 tons of dry solids took the form of 16,530 tons of sludge to be hauled away for disposal.

The amounts of solids to be filtered increased significantly during the year from approximately 170 tons per month to 250 tons per month. This is a reflection of the increased amount of solids being removed at the plant.

During August, there was a significant reduction in ferric chloride consumption. Since the yield rate and time consumption have not changed appreciably, the reduction in ferric chloride will reduce filtering costs.

CHLORINATION

MONTH	PLANT FLOW (M.G.)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	181.60	---	---
FEBRUARY	157.62	---	---
MARCH	197.80	---	---
APRIL	177.00	---	---
MAY	178.00	2,747	1.54
JUNE	164.16	3,113	1.90
JULY	177.80	2,345	1.32
AUGUST	164.90	2,290	1.39
SEPTEMBER	169.10	3,708	2.19
OCTOBER	168.60	1,038*	---
NOVEMBER	166.79	---	---
DECEMBER	136.96	---	---
TOTAL	2,040.33	15,241	---
AVERAGE	170.02	2,540	1.50

* THIS FIGURE NOT CONSIDERED IN CALCULATIONS AS INDICATED BELOW.

COMMENTS

Chlorine at this plant is normally used for disinfection of the final effluent during the months from May to September inclusive. Approximately 1.5 ppm of chlorine is necessary to give a 15 minute residual of 0.5 ppm.

In an effort to increase the dissolved oxygen content in the aeration section, chlorine was added to the influent works. This was discontinued on October 17th as the results obtained were not sufficient to warrant the expense.

1963

PLANT — **Total Operating Costs** — **MONTHLY**

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY	WATER
JAN	10,239.70	7,043.24	---	197.97	1,898.89	237.50	97.90	53.39	70.00	359.71	281.10
FEB	13,266.40	7,486.93	---	379.29	1,918.33	2,394.71	302.34	72.03	195.98	516.79	---
MARCH	13,709.10	8,361.07	---	607.54	1,872.97	(475.18)	145.78	---	---	2,889.41	307.51
APRIL	13,140.94	7,892.83	---	465.20	1,944.25	1,853.25	157.34	---	170.74	657.33	---
MAY	14,396.30	7,897.36	---	161.89	1,801.90	2,278.97	187.33	178.05	168.15	1,431.69	290.96
JUNE	13,391.97	7,922.88	136.00	(44.00)	1,912.28	2,292.51	412.92	---	25.17	734.21	---
JULY	23,048.13	11,294.47	367.20	451.24	1,834.52	7,222.61	385.66	---	142.20	627.31	722.92
AUG	11,376.87	7,270.32	244.80	---	1,886.14	1,159.48	350.97	100.00	190.47	174.69	---
SEPT	14,190.46	7,541.51	100.62	---	1,860.66	2,051.26	160.13	---	384.08	933.06	1,159.14
OCT	13,477.55	7,898.54	---	(60.50)	1,828.04	2,502.74	386.76	---	404.74	517.23	---
NOV	13,571.05	7,732.04	---	---	2,060.25	2,210.57	137.66	---	36.50	458.12	935.91
DEC	21,364.82	11,393.83	---	67.00	4,120.92	3,296.26	846.53	354.34	411.97	482.62	391.35
TOTAL	175,173.29	99,735.02	848.62	2,225.63	24,939.15	27,024.68	3,571.32	757.81	2,200.00	9,782.17	4,088.89

PLANT — **YEARLY**

YEAR	M.G. TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER CAPITA PER YEAR
1961	2287	155,665.80	68.00	2.86
1962	2082	161,031.47	77.00	2.92
1963	2040	175,173.29	85.87	3.17

CALCULATIONS IN THIS TABLE WERE BASED ON A POPULATION OF 55,201.

VACUUM FILTER COSTS MONTHLY

MONTH	COST PER MONTH					ACCUMU-LATIVE TOTAL	COST PER TON DRY WEIGHT					ACCUMU-LATIVE TOTAL
	$FeCl_3$	LIME	LABOUR	ELEC	MAINT		$FeCl_3$	LIME	LABOUR	ELEC	MAINT	
JANUARY	1087.65	463.93	772.00	238.00	102.00	2663.58	6.40	2.73	4.54	1.40	.60	15.67
FEBRUARY	1001.91	481.78	736.00	226.80	97.20	2543.69	6.18	2.97	4.54	1.40	.60	15.69
MARCH	1045.79	487.55	780.00	239.40	102.60	2655.34	6.12	2.85	4.56	1.40	.60	15.53
APRIL	1265.88	580.04	844.00	280.00	120.00	3089.92	6.33	2.90	4.22	1.40	.60	15.45
MAY	1489.15	630.00	928.00	299.60	128.40	3475.15	6.96	2.94	4.34	1.40	.60	16.24
JUNE	1078.03	477.23	708.00	242.20	103.80	2609.26	6.23	2.76	4.09	1.40	.60	15.08
JULY	1267.24	578.90	846.00	313.60	134.40	3140.14	5.66	2.58	3.78	1.40	.60	14.02
AUGUST	546.78	612.15	866.00	289.80	124.20	2438.93	2.64	2.96	4.18	1.40	.60	11.78
SEPTEMBER	673.60	597.28	944.00	322.00	138.00	2674.88	2.93	2.60	4.10	1.40	.60	11.63
OCTOBER	552.11	721.88	1002.00	327.60	140.40	2743.99	2.36	3.08	4.28	1.40	.60	11.72
NOVEMBER	815.49	676.81	1228.00	383.60	164.40	3268.30	2.98	2.47	4.48	1.40	.60	11.93
DECEMBER	681.27	567.52	1192.00	361.20	154.80	2956.79	2.64	2.20	4.62	1.40	.60	11.46
TOTAL	11,504.90	6875.07	10,846.00	3523.80	1510.20	34,259.97	57.43	33.04	51.73	16.80	7.20	166.20
AVERAGE PER MONTH	958.74	572.92	903.83	293.65	125.85	2855.00	4.79	2.75	4.31	1.40	.60	13.97

COMMENTS

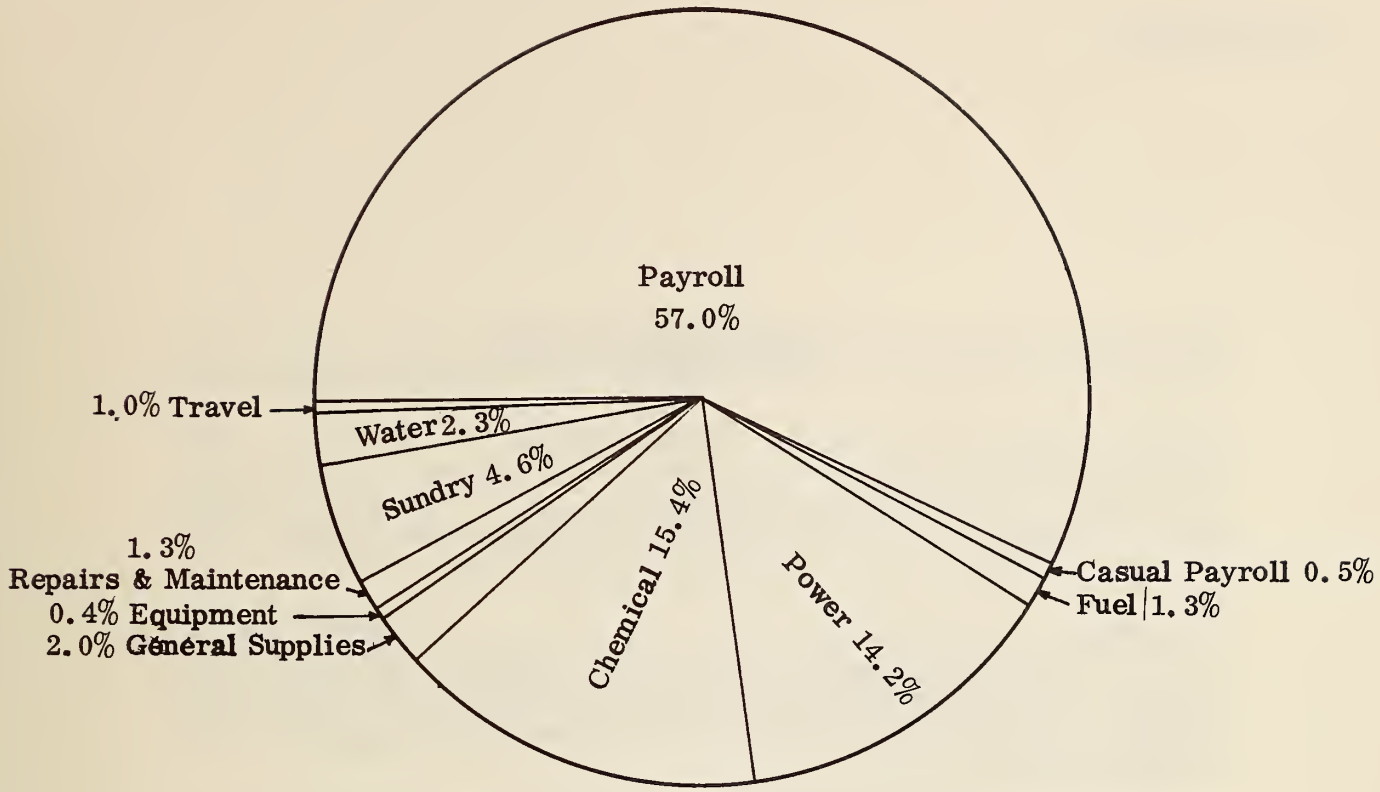
The cost of filtering digested sludge in 1963 was $13.97 per ton of dry solids. This compares with the 1961 and 1962 costs of $14.10 and $13.60 respectively.

The significant feature of the above chart is the reduction achieved in the ferric chloride dosage during the last five months of the year. This adjustment resulted in an average cost per ton of dry solids of $11.70 as opposed to the cost for the first seven months of $15.38 per dry ton.

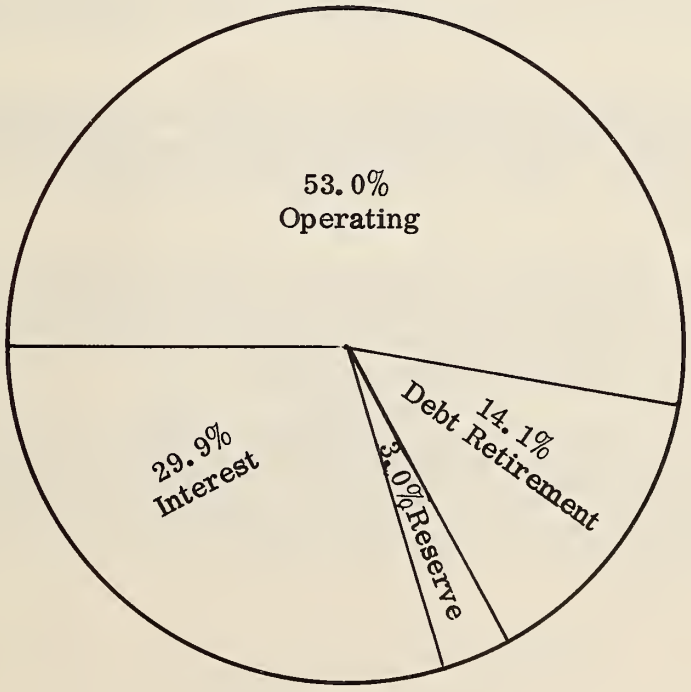
During 1963 filtered sludge was disposed of by hauling it to the city dump located directly behind the plant. A total of 14,663 cubic yards of filtered sludge was hauled during the year at a cost of $ .29 per cubic yard.

1963

OPERATING COSTS



TOTAL ANNUAL COST



SUMMARY

This report has given in detail significant data on the operation of the various treatment units at the Brantford Water Pollution Control Plant.

With an average daily flow of 5.6 million gallons, the plant is still below its full treatment capacity of 12.5 million gallons per day. The annual flow to the plant has decreased slightly since 1961. This is felt to be due to a decrease in storm water entering the sanitary sewers and changes in some industries. Flow is expected to increase during 1964.

The effluent being discharged to the Grand River is satisfactory, although it has a biochemical oxygen demand slightly above the OWRC objectives. During 1964, further attempts will be made to improve the quality of the effluent. Special attention will be given to improving the operation of the aeration tanks.

As an indication of the stronger sewage being received, because of decreased storm water infiltration, the amount of sludge being pumped to the digester and filtered has risen significantly during the year. During 1962, 8.12 million gallons of sludge were pumped to the digester and 1,908 tons of dry solids were filtered. In 1963, sludge pumped to the digesters rose to 10.10 million gallons and 2517 tons of dry solids were filtered.

The operating costs for the plant have continued to increase due to the increasing cost of labour, chemicals for filtering sludge, plant maintenance and supplies. This trend is expected to continue in pace with the cost of living.

As the plant gets older, maintenance of plant equipment will require more attention. OWRC head office technicians spent over 100 man hours in inspecting and reporting on the mechanical and electrical maintenance being routinely performed by the plant staff.

Under constant supervision by head office engineers, the plant staff has operated and maintained a clean, attractive and efficient plant for the City of Brantford. Special attention is given to good public relations and every year hundreds of casual visitors and dozens of organizations tour the facilities.

Total 1963 Costs

The total cost to the municipality during 1963 was as follows:

Operating	$ 175,216.38
Debt Retirement	$ 46,655.00
Reserve	$ 10,000.00
Interest	$ 99,030.92
TOTAL	

Note: The amount in the R 1963 was $ 36,897.44.

On the basis of the po cost of the Brantford Water Pollution C per person.

Division of Plant Operations

ONTARIO WATER RESOURCES COMMISSION
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